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LIDAR Workshop Introduction 2007-05

LIDAR Littoral Studies Workshop - May 2007

Richard C. Olsen, Naval Postgraduate School
Workshop Introduction (.pdf file)

Joe Liadsky, Optech, Inc.
Introduction to LIDAR Systems (.pdf - 2.5 MB)
Airborne LIDAR Bathymetry (.pdf file - 7.7 MB)

Charles E. Wiggins, JALBTCX
Airborne LIDAR Bathymetry (.pdf file - 7.7 MB)

William Philpot, Cornell University
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David Streutker, Idaho State University
Change Detection with LIDAR Data (.pdf file - 2.1 MB)

Qi Chen , University of California, Berkley
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David Kao , NASA Ames Research Center
LidarVis: An Interactive Visualization Tool For Analyzing Spatially Varying Distribution Data

Abstract

Joe Liadsky, Optech, Inc.
Introduction to LIDAR Systems and
Commercial LIDAR Mapping and Imaging Systems

Optech has been a world leader in airborne laser bathymetry for two decades, and the Marine Survey Division continues to pace the field with the SHOALS Airborne Laser Bathymeter. Presentation

Charles E. Wiggins, JALBTCX
Airborne LIDAR Bathymetry

When considering topographic and bathymetric mapping, the shallow-water coastal zone presents significant challenges for collecting accurate, high-density elevations and, in many locations, exists as an area where changes are most dynamic. Despite some limitations, airborne LIght Detection And Ranging (LIDAR) bathymetry is one tool utilized by the Joint Airborne Lidar Bathymetry Technical Center of Expertise (JALBTCX) to collect data in the coastal zone supporting production of GIS information relevant to a variety of disciplines. Since 1996, the US Army Corps of Engineers (USACE) and the Naval Oceanographic Office (NAVO), two ofthe JALBTCX members, have utilized LIDAR bathymetry to support navigation channel operations, nautical charting needs and regional sediment budget management.

William Philpot, Cornell University
Lidar Bathymetry in Very Shallow Waters

Mapping shallow waters with acoustic techniques is complicated and expensive. The environmental parameters become very noisy and they greatly impact the accuracy of survey measurements. Current Airborne LIDAR Bathymetry surveying in shallow-water depths uses green-channel waveforms to measure the water depth. Unfortunately, due to difficulties in distinguishing between the surface and bottom return of the water column, the specific water depth is often ambiguous. Furthermore, the water often becomes optically “dirty” due to its turbulent nature at these shallow depths. Therefore, it is common to find coastal areas lacking any measured depths. This presentation describes a novel approach for measuring water depths in these shallow coastal waters. Observations of the red-channel waveforms show that the waveforms are divided into two groups: waveforms in deep waters whose shape is invariant with respect to the water depth; waveforms in shallow-water depths which show a change in shape according to the depth in the water column. The data for this study are from 2000-2001 USGS surveys in Lake Michigan and Lake Tahoe, CA using an Optech SHOALS-400 LIDAR system.

David Streutker, Idaho State University
Change Detection with LIDAR Data

The advent of high-resolution LiDAR sensors has allowed for the measurement of topographic features with ever-increasing precision and accuracy. A consequence of this technological progression is the ability to detect and monitor structural change at a minute level. Applications to the littoral zone include monitoring beach erosion and deposition, aeolian transport, cliff erosion, and vegetation change. This talk will present methods for change detection with LiDAR data, as well as some associated challenges.

Qi Chen , University of California, Berkley
Mapping Terrain and Forest Information with Airborne LIDAR Data

Lidar is changing the paradigm of terrain mapping and gaining popularity in many applications such as floodplain and coastal area mapping, hydrology, geomorphology, forest inventory, urban planning, and landscape ecology. Although lidar data has become more affordable for average users, how to effectively process the raw data and extract useful information remains a big challenge. In this talk, I will present my recent research work on lidar data processing and information extraction. Specifically, I will introduce 1) a method of filtering laser point cloud into ground returns and object returns, 2) a method of isolating individual trees and delineating their boundaries based on the lidar data, and 3) a new lidar metric to predict individual-tree structural information including basal area and biomass

structural information including basal area and biomass.

David Kao , NASA Ames Research Center
LidarVis: An Interactive Visualization Tool For Analyzing Spatially Varying Distribution Data

LidarVis is a software program for visualizing distribution data collected from lidar. LidarVis deals with the multivalue nature of the data. That is, at each grid cell, there are multiple values of a single variable. We refer to this data type as distribution data. Examples of a distribution lidar
data set from forest provide information on forest structures, tree size, and density. LidarVis provides advanced query capabilities that allow the scientists to locate distributions with specific characteristics. LidarVis also allows the scientists to define the requirements of a significant bump/peak by the percentage of the area covered by the peak. Though, LidarVis was developed originally to deal with multi-return lidar data sets, it can be easily used for distribution data sets from other applications. In this talk, I'll outline the major features of LidarVis and then give a brief demo of this interactive visualization tool.